

## REMARKS

Entry of the amendments is respectfully requested since it should avoid the need for or lessen the issues on appeal.

Claims 1-7 are before the Examiner. Claims 1, 4 and 5 have been amended to more clearly tract with the arguments presented- the BET surface of the doped oxide is between 1 and 1000 m<sup>2</sup>/g and the breadth of the distribution of particle size is at least 0.7.

Claims 1-7 are rejected under 35 USC 103(a) as unpatentable over CA (2,223,377) in view of Vanell (6,423,638). Applicants respectfully traverse.

Claim 1 is directed to potassium doped pyrogenically produced metal or metalloid oxide particles having a breadth of distribution of at least 0.7 and a BET surface area between 1 and 1000 m<sup>2</sup>/g. The mixture is suitable for direct use in the polishing of silicon chips. There is no need to filter the mixture to remove "oversized" particles since there is no agglomeration of particles over time due to potassium doping and the "pyrogenic nature" of the particles. Claim 4 is directed to the method of preparation of these particles and claim 5 is directed to a composition suitable for use as a polishing agent.

The combination of CA (2,223,377) with Vanell (US 6,423,838) appears to have been assembled by hindsight, because Vanell does not describe pyrogenically produced oxides of metals or metalloides. There is no recognition by the references, taken alone or in combination, that a silicon chip polishing composition could be prepared that is stable to agglomeration over time and that avoids the need for filtration to remove oversized particles, agglomerates, prior to use.

Vanell discloses in column 1 the technical problem of the wafer-polishing process (see column 1, lines 33 to 63). The problem is stated as follows: The type of chemicals and abrasives used in the polishing process vary depending on the materials being removed from the semiconductor wafer. The limits of the polishing process are, in a large part, controlled by the size of particles in the polishing slurry. Semiconductor manufacturers typically do not filter polishing slurry during semiconductor wafer processing. Filtering is very costly if used on colloidal suspensions due to filter cost and the need for continuous maintenance of the filters. There are also problems with particle shedding from the filter, low flow rates due to blinding, and loss of adequate solids in the colloidal suspension. The absolute limit on particle size is determined by the chemical supplier producing the polishing chemistry. The time delay between shipment and usage at the semiconductor manufacture site allows the polishing slurry to agglomerate producing larger particles. Mechanisms that increase agglomeration are chilling, drying, and excessive agitation. The larger particles produce scratches on the semiconductor wafer during the polishing process that can affect wafer yields and product reliability.

Accordingly, it would be advantageous to have a filter capable of filtering a colloidal suspension with a flow rate that allows real-time filtering in an industrial application. More specifically, it is desirable that the filter allows for point-of-use filtering on a chemical mechanical planarization tool, reduces particle size to an optimal number, and increases uniformity of the polishing slurry. It would be of further advantage for the filter to require little or no maintenance and have no impact on the semiconductor wafer throughout the factory.

Additionally, Vanell discloses in column 2, lines 47 to 65 that ideally, a polishing slurry comprises abrasive particles having a size distribution in a narrow range i.e., the abrasive particles are of uniform size and the abrasive particles are distributed in a constant density throughout the slurry. In practice, most polishing slurry is delivered by a chemical supplier having a wide distribution of particles sizes. The polishing slurry is not used immediately by a semiconductor manufacturer allowing agglomeration to occur between the delivery time and the time of use. Agglomeration is the formation of a larger particle by the action of two or more particles combining together. Agglomeration widens the particle size distribution and degrades the quality of the polishing slurry. In

fact, there are certain types of polishing slurries that would be extremely effective in polishing semiconductor wafers but have been rendered useable due to the agglomeration problem. Chemical mechanical planarization may not be feasible at small feature sizes for semiconductor wafer processing without control over the particle size and distribution at the time of use.

The only solution to this problem in avoiding the agglomerates disclosed by Vanell is the filtering of the colloidal solution. According to column 8, line 12 in the colloidal suspension the particles show a diameter of less than 0.2 microns.

The claimed invention represents a solution where there is no filtering process is used. The pyrogenically produced metal oxide or metalloid oxide according to Applicants' invention shows an average particle size of less than 100 nanometers and the breadth of the distribution of particle size of at least 0.7 (see page 2 paragraph 4 of the specification).

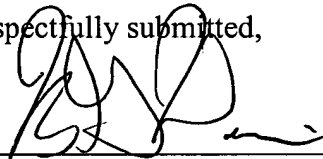
It should be noted that neither Vanell nor CA '377 disclose the final product nor do they point the way towards the solution represented by the claimed invention- particles having the desired size which resist agglomeration over time due to their chemical nature. Vanell discloses the problems of the wafer manufactures, but does not disclose the claimed product.

The rationale provided by the Examiner appears to be based on an "obvious to try" standard where the combination of references is only suggested if one relies on Applicants' specification. A proper prima facie case of obviousness has not been established. Withdrawal of the rejection is respectfully requested.

In view of the foregoing amendments and remarks, the application is believed to be in condition for allowance and a notice to that effect is respectfully requested.

Should the Examiner not find the Application to be in allowable condition or believe that a conference would be of value in expediting the prosecution of the Application, Applicants request that the Examiner telephone undersigned to discuss the case and afford Applicants an opportunity to submit any Supplemental Amendment that might advance prosecution and place the Application in allowable condition.

Respectfully submitted,



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